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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification<sup>3</sup> :</b> <b>A01N 25/34, 25/00 // A01N 47/18</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 84/ 02447</b> <b>(43) International Publication Date:</b> <b>5 July 1984 (05.07.84)</b>
<b>(21) International Application Number:</b> PCT/AU83/00188 <b>(22) International Filing Date:</b> 20 December 1983 (20.12.83) <b>(31) Priority Application Numbers:</b> PF 7337 PF 9526 <b>(32) Priority Dates:</b> 20 December 1982 (20.12.82) 25 May 1983 (25.05.83) <b>(33) Priority Country:</b> AU <b>(71)(72) Applicants and Inventors:</b> PARRY, Lawrence, John [AU/AU]; MORRISON, Bruce, Jon [AU/AU]; 8 Tas- man Court, Wagaman, Northern Territory 5790 (AU). <b>(74) Agent:</b> GRANT ADAMS & COMPANY; 333 Adelaide Street, (G.P.O. Box 1413), Brisbane, QLD 4000 (AU).		<b>(81) Designated States:</b> AT (European patent), AU, BE (Eu- ropean patent), CH (European patent), DE (Euro- pean patent), FR (European patent), GB, GB (Euro- pean patent), JP, LU (European patent), NL (Euro- pean patent), SE (Europe... atent), SU, US.  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> PESTICIDAL SHEETS OR CONTAINERS  <b>(57) Abstract</b> <p>An item (including a sheet or lamina) is treated to proof the item, or a surface or area in which the item is placed, against crawling insects, by printing or spraying the item, or immersing the item in, a pesticide/liquid carrier solution and then drying the solution to remove the liquid carrier, to leave a residue pesticide in or on the material of the item to be con-  tacted by the crawling insects. The pesticide/carrier solution may be applied to the item by mixing the pesticide in a suit-  able ink and printing the solution onto the item by flexopress, offset or letterpress printing methods or by silk-screening  methods.</p>		

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Title: "PESTICIDAL SHEETS OR CONTAINERS"

BACKGROUND OF THE INVENTION

(1) Field of the Invention

This invention relates to pesticidal sheets, containers or the like and to methods of manufacturing same.

(2) Description of the Prior Art

There are two main methods for applying pesticidal protection to a surface or area. The first method is to apply the pesticide to the surface by mixing it with a liquid carrier, spraying the mixture onto the surface and allowing the liquid carrier to evaporate, leaving the pesticide as a residue. The pests come into contact with the pesticide and die. These pesticides have an effective life of approximately 3 months. However, their effectiveness can be markedly reduced if the surface is washed or becomes damp, removing the pesticide. Because of the nature of spraying the pesticide onto the surface, a uniform distribution of pesticide cannot be assured and so a relative high toxicity level must be used to ensure effectiveness. Even then, areas of the surface may be missed, allowing the pests to pass through a target zone without coming into contact with the pesticide.

The second method is to employ pest strips which contain a vaporizing pesticide which must diffuse throughout the area to be protected. Again, as the pesticide must be effective throughout the whole area, fairly high toxicity levels must be used. As the pesticide must be able to vapourize, it is generally unstable and means must be provided to control the breakdown of the pesticide or the effective life of the strip would only be from a few hours to e.g. 7-10 days.

For example, Australian Patent No. 491714 (Herculite Protective Fabrics Corporation) discloses a pesticidal strip where a pesticidal impregnated sheet is



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enclosed in a nonporous container which allows a controlled migration of the pesticide to the surface of the container. The patent states it is essential to use this form of encapsulation as the pesticides are subject to rapid breakdown (or decomposition) at 100°F and gives examples of pesticides which have effective lives in open atmosphere, of approximately 7-10 days but which may be effective for upto 90 days using the encapsulation method. Should the container be damaged, the pesticides would rapidly lose their effectiveness and the user would be exposed to very high toxicity levels with detrimental health effects. The pesticides employed rely on their vapourising characteristics, and leave little, if any, residue.

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SUMMARY OF THE PRESENT INVENTION

It is an object of the present invention to provide a sheet container or the like, hereinafter referred to as an item, which is provided with the pesticide to protect the item from pest attack and/or to protect at or adjacent a target zone to kill pests which come in contact with the item.

It is a preferred object to provide a pesticidal item where the protection against pests is available at much lower toxicity levels than for conventional methods.

It is a further preferred object to provide a pesticidal item which has a long effective life.

It is a still further preferred object to provide a pesticidal item which can be easily and economically manufactured.

Other preferred objects of the present invention will become apparent from the following description.

In one aspect the present invention resides in a method of manufacturing an item applicable to a surface or area to proof the item, surface or area against crawling insects, the method including the steps of:



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(a) mixing a pesticide with a liquid carrier;  
(b) applying the pesticide/carrier solution  
to the item; and

(c) drying the solution to remove the liquid  
5 carrier and to leave the pesticide in or on the item to be  
contacted by the crawling insects.

In a second aspect the present invention resides in  
an item manufactured by the above method.

In one preferred embodiment, the pesticide is  
10 applied to the surface(s) of the item by printing the  
pesticide/carrier solution onto the item using e.g. a  
flexopress, offset press or letterpress. Alternatively,  
the pesticide may be applied by silk screening methods. In  
other alternative preferred embodiments, the item is  
15 impregnated with the pesticide by immersion of the item in  
the solution, or by spraying the item with the solution,  
so that the pesticide is preferably retained in the material  
of the item as a residue of fine crystals, uniform in size  
and distributed uniformly throughout the material of the  
20 item.

For the printing embodiments, it is preferred that  
the pesticide is a wettable-powder or liquid pesticide  
which is soluble in water-based or alcohol based printer's  
inks or milled inks, or soluble in a suitable common solvent  
25 for the pesticide and ink. Preferably the inks are suitable  
for the flexopress, offset or letterpress methods of print-  
ing. A preferred pesticide for this embodiment is sold  
under the trade mark "WP80" by Bager AG.

For the immersion or spraying embodiments, a  
30 preferred pesticide is "Propoxur" (2-Isopropoxy-phenyl-N-  
methyl) developed by Bager AG and the subject of U.S. Patent  
No. 3,111,539 assigned to Bayer. "Propoxur" is also  
suitable for the printing embodiment. Other commercially  
available residual contact pesticides may be used for all  
35 the embodiments and these include carbamates, such as



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bendicarb, chlorinated hydrocarbons, organic phosphates such as idophenphos, fenitrochion or Dursban, and pyrethroids, including synthetic pyrethroids.

The pesticide/carrier solution (e.g. pesticide/ink mixture) may be printed or sprayed directly onto the items, or the items immersed in the solution, to proof the items against crawling insect attack or the solution may be applied to sheets, laminae or the like to be placed in a target zone to protect the target zone from the crawling insects. The solution may be applied to e.g. legal or archival documents, or the containers for same, to prevent the insects from destroying the valuable documents.

Suitable sheets or laminae include paper or paper-like materials, paper mache, thin felt, cloth, plastics materials or other suitable liquid absorbent materials. One particularly suitable as the sheets or laminae is newsprint, which is highly absorbent.

Preferably the sheets or laminae can be readily cut to size and shape to enable them to be fitted to a surface and the sheets or laminae may be provided with an adhesive backing to enable the sheets or laminae to be fixed to the surface. The sheets or laminae may also be provided with a waterproof membrane to enable the sheets or laminae to break down in soil to leave a pesticidal barrier in the soil.

Preferably the printed items or treated sheets or laminae are odourless and non-staining. Preferably the toxicity level of the pesticidal material in or on the items, sheets or laminae is lower than for conventional methods for using contact pesticides and the toxicity level may be up to e.g. 60% lower, making the items, sheets or laminae safe to handle by humans.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

To enable the invention to be fully understood, a number of preferred embodiments will now be described.



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Example I

Wettable residual pesticide powder sold under the trade mark "WP80" (80% strength) sold by Bayer AG is mixed in water-based printer's ink in the ratio of approximately 30%: 70% by weight. The resultant solution is printed onto a sheet by conventional offset printing methods and the solution dries to leave pesticidal bearing ink on the sheet, the pesticide being in the form of fine crystals substantially uniformly distributed through the ink. (For offset and letterpress printing, the solution may contain upto approximately 30% pesticide, high concentration being usable for flexopress printing). Depending on the thickness and material of the sheet, it may be bound e.g. to a book, typed or printed on as a legal document or formed into a container e.g. a cardboard box. Alternatively, the sheet may be cut to size and shape and placed under a kitchen sink, bathroom vanity unit and/or laundry tub unit.

Tests have shown that if a cockroach is exposed to the pesticide for 2 minutes, it is incapacitated in 45 minutes and dead in less than an hour. The effective life of the pesticide, particularly when used in the printing of a book, may be many years. In this way, the invention may be used to provide protection for legal and archival material at very low cost. The documents may themselves be printed with the ink pesticidal solution or contained in boxes or cartons so printed or in containers supplied with replaceable pesticidal sheets.

Example II

A length of pliable paper sheet is drawn from a roll and immersed in a bath containing "Propoxur" dissolved in water at the ratio of 60ml. to 10L. The wetted sheet is withdrawn and passed through squeeze rollers to remove the excess liquid. The sheet is then dried using heated air. The resultant sheet has fine crystals of the





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Propoxur uniformly distributed throughout it. Again, the sheet may be cut to size and shape and placed under a kitchen sink, bathroom vanity unit and laundry tub unit.

After approximately 10 days, all the cockroaches in the house are dead. As the protection remains for 12-18 months, any new cockroaches entering the house are also killed during that period.

As cockroaches forage at night, the effectiveness of the sheets may be further increased by using paper sheet having a "furry" surface which increases the effective surface area of the sheet which the cockroaches can come into contact with.

The sheet may be semi-rigid and supplied in the form of mats or pads, depending on the intended application. The mats or pads may be applied to the floors of ships holds or may be provided as a lining for shipping containers, suitable adhesives being applied to one side of the mat or pad to hold them in place. The sheets may also be placed in pet's kennels to kill fleas or ticks.

To protect young trees, when planting, against termites, the holes for the trees may be lined with paper mache impregnated or printed with pesticide. The tree is planted and the hole is filled in. The paper mache breaks down leaving the pesticide as a residual barrier around the roots of the tree.

To provide a termite barrier for house foundations, a waterproof membrane backing (similar to "Ferticon") is applied to the impregnated or printed "paper" sheet. The sheet breaks down, leaving an even distributed pesticide residue under the concrete slab or around the concrete piles.

As the pesticidal sheets are odourless, non-staining and have a very low toxicity level, they can be easily handled by humans and for domestic applications the sheets can be cut from a roll or mat as required. The sheets are contact killers which are highly effective and can be



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easily removed, replaced and stored, with an estimated undefined shelf and an effective life of e.g. 12-18 months.

5 As can be readily seen the sheets are safe to humans and pets, yet deadly for pests, a claim which few if any currently available pesticides or pest strips can make.

10 It will be readily apparent to the skilled addressee that the choice of sheets or lamina, pesticidal materials and potential applications is almost unlimited and so various changes and modifications may be made to the embodiments described without departing from the scope of the present invention defined in the appended claims.

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CLAIMS.

1. A method of manufacturing an item applicable to a surface or area to proof the item, surface or area against crawling insects, the method including the steps of:
  - (a) mixing a pesticide with a liquid carrier;
  - (b) applying the pesticide/carrier solution to the item; and
  - (c) drying the solution to remove the liquid carrier and to leave the pesticide in or on the item to be contacted by the crawling insects.
2. A method as claimed in Claim 1 wherein:  
the pesticide is a residual contact pesticide retained in or on the material of the item as a residue of fine crystals.
3. A method as claimed in Claim 1 or Claim 2 wherein:  
the liquid is a printer's ink or ink/solvent mixture;  
the pesticide is a wettable-powder or liquid pesticide soluble in a water-or alcohol based printer's ink or the solvent; and  
the solution is applied to the surface or surfaces of the item by printing or silk-screening methods.
4. A method as claimed in Claim 3 wherein:  
a flexopress, offset press or letterpress is used to apply the pesticide/carrier solution to the item.
5. A method as claimed in Claim 1 or Claim 2 wherein:  
the pesticide/carrier solution is applied by spraying the solution onto the item to impregnate the material of the item with the pesticide.
6. A method as claimed in Claim 1 or Claim 2 wherein:  
the pesticide/carrier solution is applied by immersing the item in the solution to impregnate the material of the item with the pesticide.
7. A method as claimed in Claim 5 or Claim 6 wherein:  
after the item is dried, the pesticide is



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retained in the material of the item as residue of fine crystals, uniform in size and distributed uniformly throughout the material of the item.

8. A method as claimed in any one of Claims 1 to 7 wherein:

the pesticide is a contact pesticide including one or more of the following:

"WP80" by Bayer AG; carbamates including "Propoxur" and bendicarb; chlorinated hydrocarbons; organic phosphates including idophenphos, fenitrochion and Dursban; and/or pyrethroids including synthetic pyrethroids.

9. A method as claimed in Claim 8 wherein:

the toxicity level of the pesticide is upto 60% lower than the contact pesticides applied by conventional methods and the pesticide is odourless and non-staining.

10. A method as claimed in any one of Claims 1 to 9 wherein:

the item is a sheet or lamina of paper, newsprint or paper-like materials.



## INTERNATIONAL SEARCH REPORT

International Application No PCT/AU83/00188

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>3</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
AO1N 25/34, 25/00 // AO1N 47/18		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>4</sup>		
Classification System	Classification Symbols	
IPC	AO1N 17/12, 25/34, 25/00	
US Cl.	424-27	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched <sup>5</sup>		
AU: Australian Classification 87.18.62; 87.18.55; 87.16		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>		
Category <sup>6</sup>	Citation of Document, <sup>15</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>
X, Y	AU, B, 16701/76 (504712) (HERCULITE PROTECTIVE FABRICS CORP.) 16 February 1978 (16.02.78) (& US, A, 4102991, & US, A, 4320113, & CA, A, 1052266, & GB, A, 1544100, & FR, A, 2320053, & JP, A, 55044574) See Example 1	(1)
X	AU, B, 87672/75 (499894) (IMPERIAL CHEMICAL INDUSTRIES LTD.) 23 June 1977 (23.06.77) (& GB, A, 1492609) See page 1a, lines 3-8, page 4 lines 5-11, page 5 line 17 et seq.	(1)
X, Y	AU, B, 75221/74 (491320) (KUREHA KAGAKU KOGYO K.K.) 13 May 1976 (13.05.76) (& DE, A, 2454035, & FR, A, 2250479, & JP, A, 50081868, & GB, A, 1440860, & US, A, 3972993) See example 3.	(1)
X	US, A, 2157449 (BERG) 9 May 1939 (09.05.39) See column 2 lines 2-6	(1-2, 10)
Y	US, A, 1494085 (TURNER) 13 May 1924 (13.05.24)	(1)
Y	US, A, 1739840 (KENDALL) 17 December 1929 (17.12.29)	(1)
X, Y	GB, A, 1436075 (HERCULITE PROTECTIVE FABRICS CORP) 19 May 1976 (19.05.76) (& DE, A, 2445753, & FR, A,	(1)
CONTINUED		
<p>* Special categories of cited documents: <sup>19</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search <sup>2</sup>		Date of Mailing of this International Search Report <sup>20</sup>
2 March 1984 (02.03.84)		08 MARCH 1984 (08.03.84)
International Searching Authority <sup>1</sup>		Signature of Authorized Officer <sup>21</sup>
Australian Patent Office		A.S. MOORE <i>A. S. Moore</i>

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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No <sup>18</sup>
	2244403, & JP, A, 50076233 & SU, A, 556719) See page 1, lines 6-9, page 2 line 10, and Example 1.	
Y	GB, A, 2084021 (ROUSSEL-UCLAF) 7 April 1982 (07.04.82) (& FR, A, 2491037, & JP, A, 57085306, & DE, A, 3138279) See page 1 lines 33-51, page 2 lines 6-17.	(1,10)
Y	DE, A, 2832248 (CELAMERCK GmbH & CO.) 31 January 1980 (31.01.80) (& JP, A, 55019276, & FR, A, 2431254) See page 5 lines 19-32.	(1)